

# REMARKS

Applicants respectfully request Examiner Nguyen to admit this Amendment to place subject Application in condition for allowance and/or present rejected claims in better form for consideration on appeal. In particular, Claim 21 has been amended to be commensurate with the working examples in the specification, more particularly point out and distinctly claim the subject matter which applicants regard as the invention, and to comply with requirements under 35 U.S.C. § 112.

Claim 21 has been amended to recite:

reacting a petroleum distillate consisting essentially of material boiling between about 50° C. and about 425° C. comprising a mixture of sulfur-containing, nitrogen-containing and other organic compounds derived from natural petroleum with a source of hydrogen at hydrogenation conditions in the presence of a hydrogenation catalyst to assist by hydrogenation removal of sulfur and/or nitrogen from hydrotreated distillate;

partitioning by distillation the hydrotreated distillate to provide at least one low-boiling organic part consisting of a sulfur-lean, mono-aromatic-rich fraction, collected below a temperature in the range from 260° C. to 300° C., comprising a mixture of sulfur-containing, nitrogen-containing and other organic compounds derived from natural petroleum and a high-boiling organic part consisting of a sulfur-rich, mono-aromatic-lean fraction; . . .

contacting a gaseous source of dioxygen with at least a portion of the low-boiling organic part in a liquid reaction medium containing a particulate, heterogeneous oxygenation catalyst system which exhibits a capability to enhance the incorporation of oxygen into a mixture of liquid organic compounds and comprises one or more catalyst metal selected from the group consisting of chromium, molybdenum, bismuth, manganese, iron, and platinum, employed as metal oxide, mixed metal oxide, and/or basic salts of the metal or mixed metal oxide, while maintaining the reaction medium substantially free of halogen and/or halogen-containing compounds, to form a liquid mixture comprising hydrocarbons, oxygenated organic compounds, water of reaction, and acidic co-products, such that the oxygenation of the hydrocarbon portion of the liquid mixture is more than 1 percent by weight; . . .

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Support for these amendments is found in the Specification, for example at page 38, line 21 to page 39, line 22.

Claim Rejections - 35 U.S.C. § 112

5 In outstanding Office Action, Claims 21 to 28 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Examiner Nguyen avers that the specification does not have support for "mono aromatic-rich fraction having a sulfur level of no more than 25 ppm" (ranging 0-25 ppm). Applicants respectfully traverse this rejection.

10 Claims 21 to 28, all claims now presented, recite "mono-aromatic-rich fraction, collected below a temperature in the range from 260° C. to 300° C.", and the term "having a sulfur level of no more than 25 ppm" has been deleted.

Applicant respectfully requests Examiner Nguyen to withdraw his 112 rejections, and pass subject application for allowance.

Claim Rejections - 35 U.S.C. § 103(a)

15 In outstanding Office Action, Claims 21 to 28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Brownawell et al. (EP-0 252 606) in view of Schultz et al. (US 2,365,220) and Farkas et al. (US 2,472,152). Applicants respectfully traverse these rejections.

20 The Brownawell et al. reference of record describes a process said to increase the cetane number of a middle distillate fuel fraction by using one or more non-oxide catalytic metals to selectively oxidize benzylic carbon atoms present in the fuel to ketones. Preferably, Brownawell et al. states, the non-oxide catalyst will be one or more oil or water soluble compounds. On the other hand, the non-oxide catalytic metal compound may be insoluble in both oil and water. In non-preferred cases, the  
25 insoluble, non-oxide catalytic metal compound may be in a bulk form or supported on a suitable support material (page 5, lines 27 to 32). The Brownawell et al. reference of record does not define or illustrate the meaning of the term "suitable support material." All of the working examples in the reference of record use oil soluble metal salts;

copper sulfate pentahydrate in Examples 1 to 3, and cobalt naphthenate (6% Co) catalyst solution in Examples 4 to 6.

In contrast, instant claims recite as critical elements of Applicants' novel process the use of a liquid reaction medium containing a  
5 **particulate**, heterogeneous oxygenation catalyst system which comprises one or more catalyst metal selected from the group consisting of chromium, molybdenum, bismuth, manganese, iron and platinum. Claim 21 now recites recovery of a low-boiling oxygenated product having a low content of nitrogen, acidic co-products and a sulfur content of no more than 15  
10 ppm. Analyses of Applicants' organic liquid of low density determined sulfur contents below 10 ppm, and even as low as 6 ppm (see Example 7).

The process described in the EP reference is different in kind, not merely degree, from Applicants' novel process. As noted by Examiner, example 1 in the  
15 Brownawell et al. reference of record shows that sulfur content is decreased from 0.74 weight percent to 0.42 weight percent (4,200 ppm). By contrast instant claims are directed to a product with a sulfur content of no more than 15 ppm.

Examiner avers also that example 3 (Brownawell et al.) shows that after an  
20 oxidizing step, sulfur is reduced from 1ppm to zero. Contrary to the position of Examiner, Applicants believe one skilled in the relevant art would understand that the report of "<1 ppm" (less than 1 ppm) sulfur is a statement that the sulfur level was substantially zero in unoxidized heavy hydrocrackate. The fact that no analysis of the oxidized heavy hydrocrackate for sulfur is reported is a confirmation that example 3  
25 does not show a reduction in sulfur.

Schultz et al. suggests need for neutralizing acids in hydrocarbon effluent from non-catalytic oxidation, but does not disclose or suggest a presence of any sulfur or nitrogen containing compounds.

Farkas et al. is directed to preparation of high cetane number Diesel engine fuel  
30 by adding organic peroxides and/or organic hydroperoxides thereto. The Farkas et al. reference describes neutralizing acids in hydrocarbon effluent from non-catalytic